

EXHIBIT A
TRANSLATION OF GERMAN PATENT 101 19 835 A1
TO HEINZ GRUNEWALD

Laid-Open Print

DE 101 19 835 A 1

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Description

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[0011] In the following, an exemplary embodiment of the invention will be described in more detail on the basis of the drawing, which shows

[0012] Fig. 1 the side view of an industrial spin-dryer in the loading position in partial cross-sectional view;

5 [0013] Fig. 2 the side view of the spin-dryer from Fig. 1 in an intermediate position;

[0014] Fig. 3 the side view of the spin-dryer of Fig. 1 and 2 in the operating position;

[0015] Fig. 4 a sectional view through the spin-dryer of Fig. 3 along the line IV-IV there.

[0016] The industrial spin-dryer shown in the drawing comprises a frame 1, which in turn comprises four vertical supports 2 and a cover plate 3 set on and attached to the four
10 supports 2. In addition, reinforcement elements 4 run between the vertical supports 2 and the cover plate 3.

[0017] Placed in the middle of the cover plate 3 is a through hole 5, through which a bearing bush 6 extends. A horizontal support plate 7 is welded on the outer shell of the bearing bush 6. A plurality of damping pads 8 are positioned between the bottom side of
15 the support plate 7 and the top side of the cover plate 3. Additional damping pads 13 are located between the top side of the support plate 7 and a mounting plate 12 mounted on the cover plate 3 above the support plate 7.

[0018] A carrier shaft 9 is mounted to rotate in the bearing bush 6. Details of the bearing are not provided here. The carrier shaft 9 can be turned about the vertical axis with the

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help of a motor 10 and a gearing 11 flanged to the motor 10. Motor 10 and gearing 11 are mounted on the bearing bush 6.

[0019] Attached to the lower end of the carrier shaft 9 is a horizontal plate 14, from which two support arms 15 extend downwards at an angle of approximately 15 degrees from the vertical. Only one of the two support arms 15 is shown in the drawing. Each of the lower ends of the two support arms 15 have a bearing journal 16. The bearing journals 16, in conjunction with two pedestal bearings 17 mounted on the base of the drum unit 18, form a connection between the two support arms 15 and the drum unit 18 that pivots about a horizontal axis. Again, of the two pedestal bearings 17, only one can be seen in the drawing.

[0020] The drum unit 18 encompasses in the known manner a non-rotating outer drum 19 as well as an inner drum (not shown in the drawing), which is mounted in the outer drum 18 and serves to accommodate the laundry. Rotation of the inner drum is initiated by an electromotor 20, which is mounted directly on the end face ("bottom") of the outer drum 19 and is connected to the inner drum so as to rotate together with the latter without the intervention of a gear mechanism. To this end, the output shaft of the electromotor 20 penetrates the bottom of the outer drum 19, where it is mounted in a manner not illustrated further.

[0021] In addition, a toothed wheel 21 is attached, although in a fixed position, on the top end side of the outer drum 19 coaxial to the bearing journals 16. The toothed wheel 21 meshes with the output pinion 22 of a gear mechanism 23, which is driven by a motor 24. Motor 24 and gear mechanism 23 are attached to one of the two support arms 15.

[0022] Below the drum unit 18 there is a cover plate 25 suspended in a "floating" manner with the help of four springs 33 whose outer ends are each attached to a support 2. The springs 33 and the cover plate 25 run in an essential horizontal direction without the intervention of outside forces, as shown in Fig. 1.

[0023] The side of the drum unit 18 opposite the motor 20 has a loading opening 27 through which the laundry to be spin-dried can be admitted to the interior of the inner drum and removed afterwards. The loading opening 27 is surrounded by a cylindrical collar 28 that is relatively short as seen in the axial direction. The cover plate 25 also bears on its top side a short cylindrical collar 29 whose inner diameter corresponds approximately to the outer diameter of the collar 28 of the drum unit 18.

[0024] As can be seen in particular detail in Fig. 4, the cross-sectional shape of the outer drum 19 is not completely circular; rather, formed at one side of the outer drum 19 are two bulges 30 that are not closed on the end adjacent to the loading opening 27. These bulges 30 form pockets for discharged water.

[0025] The above description makes clear that the drum unit 18 can be moved in the following manner: For one, the drum unit 18 can be pivoted about the bearing journal 16

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through actuation of the motor 24 and the engagement of the correspondingly pivoted output pinion 22 in the toothed wheel 21. For another, the drum unit 18 can be additionally rotated in any pivoted position about the vertical axis that is common to the bearing bush 6 and the carrier shaft 9; in this case the support arms 15 are likewise pivoted about the vertical axis. Finally, it is possible in each of the described positions of the drum unit 18 to initiate rotation of the inner drum with respect to the outer drum with the help of the motor 20.

[0026] The described industrial spin-dryer operates as follows:

For the loading of laundry into the inner drum, the drum unit 18 is brought into the position shown in Fig. 1. In this position, the drum axis is oriented at an angle approximately 15 degrees from the horizontal. The pivoting position of the drum unit 18 about the vertical axis is such that the loading opening 27 of the drum unit 18 is in the region of the output end of a washing machine 31, which is schematically illustrated in Fig. 1 to 3. For transferring the laundry 31 into the drum unit 18 of the spin-dryer, a transfer slide 32 is vertically inserted between the output end 31 of the washing machine and the loading opening 27 of the drum unit 18.

[0027] After the batch of laundry has been transferred along with the rinse liquid into the slowly rotating inner drum of the drum unit 18, the batch of laundry at first moves as if in a washing machine, and is then accelerated relatively slowly for a few seconds until the first distribution of the laundry in the inner drum has occurred and a critical speed, lying between 150 and 180 revolutions per minute, has been exceeded. If the centrifugal forces are strong enough to hold the laundry at the side wall of the inner drum, the drum unit 18 is pivoted through actuation of the motor 24 such that the drum axis is oriented vertically and the loading opening 27 is pointing downwards.

[0028] On the way between the loading station, shown in Fig. 1, and the operating position, shown in Fig. 3, the drum unit 18 passes through an intermediate position, as shown in Fig. 2. In this intermediate position the lower end of the outer drum 18, in particular the cylindrical collar 28 located there, has made contact with the cover plate 25 or the collar 29 attached thereto and pressed it down. As the drum unit 18 continues to pivot, a situation now arises in which the cover plate 25 attempts to move back upwards. Under the influence of the vibrations caused by the operation of the drum unit 18 and allowed by the spring-suspension of the cover plate 25, the cylindrical collar 29 of the cover plate finally snaps over the cylindrical collar 28 of the drum unit 18. The cover plate 25 now lies over the loading opening 27 of the drum unit 18, thus preventing air from being sucked in through the loading opening 27 during the rotation of the inner drum. This serves primarily hygienic purposes, since outside and possibly contaminated air cannot reach the laundry located in the inner drum.

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[0029] The meshing of the collar 28 of the drum unit 18 in the collar 29 of the cover plate 25 has the additional effect that lateral vibrations of the lower end of the drum unit 18 are dampened by the action of the springs 33.

5 [0030] The inner drum of the drum unit 18 is brought to its full rotational speed at the latest by the time it has reached the operating position shown in Fig. 3. The batch of laundry is dehydrated to the desired degree. Once the spinning process is completed, the drum 18 is again pivoted with the help of the motor 24 about the bearing journals 16 until its axis again assumes a position as shown approximately in Fig. 2. In this position the
10 vertical. At the same time, or thereafter, the entire drum unit 18 is pivoted with the help of the motor 10 about the vertical axis into a position in which the unloading process is to take place. The rotational speed of the electromotor 20 is reduced. As the rotational speed of the inner drum decreases, the centrifugal forces acting on the laundry weaken. The laundry disengages from the side wall of the inner drum and falls out of the loading
15 opening 27.

[0031] Should it be necessary in the case of an emergency to stop the inner drum in the operating position (Fig. 3) and thus bring it to a halt, the batch of laundry fall out of the drum unit 18 onto the cover plate 25, thus protecting the laundry from damage.